

# GPS Receiver Application Module (GRAM)

The GRAM-S Test Fixture (GTF) is a test system that verifies the function and performance of the GPS Receiver Application Module (modified SEM-E form factor) or GRAM-S.

GRAM is the GPS Engine for future GPS Joint Program Office (JPO)-funded MIL-Qualified GPS receivers. Use of the GRAM as a GPS receiver engine permits function/performance enhancements using current technology, maintains backward compatibility with existing receivers, and provides a hardware upgrade option for future technology insertion. These enhancements include design and execution of receiver security, insertion of integrity monitoring (RAIM), and direct acquisition of encrypted GPS satellite signals, etc.

The GTF simulates the "Host" GPS Receiver interface. A Bi-Directional Data Port (BDDP) provides the data interface between the GRAM-S and the host LRU or GTF. The GTF tests the compliance of a vendor's GRAM-S BDDP interface to the JPO BDDP requirements established in ICD-GPS-155. The GTF hardware supports the input/output interfaces specified in the JPO requirements document RD-GPS-GRAM-S-001.

In addition to generating the host control signals, the GTF provides a graphical user interface (GUI), provides DC power, breaks out the various GRAM-S I/O signal interfaces to dedicated connectors, and provides data extraction/data logging capabilities.

The GTF supports the following GRAM-S interfaces:

- GRAM-S BDDP Interface
  - Host Control Interface
  - GRAM Configuration and Handshake Interface
- Serial Host Control (RS-422) Port
- Serial RS-232/422 Instrumentation Port
- SA/A-S Key Loading Port
- Antenna Electronics Interface
- Precise Time Interface
- Time Mark Interface

The GTF has the following software features:

- Virtual Instrument (Lab Windows) GUI
- DPRAM read/write access
- Display of interface control buffer
  - Message pointer table
  - Host control buffer
  - GRAM configuration buffer
  - GRAM identification buffer
- Read all GRAM output messages
- Write all GRAM input messages
- Support GRAM operation modes
  - Initialization
  - Tracking (unaided/aided)
  - Test
  - Power-on self-test
  - Reprogram

GTF supports MAGR 2000 bid sample testing.

GTF features:

The GTF is controlled by a desktop PC (266 MHz Pentium II). Two 32-channel digital I/O PCI boards installed within the PC drive the GTF BDDP interface.

One multiple-function PCI board provides 16 channels of A/D, two channels of D/A, two programmable timer/counters.

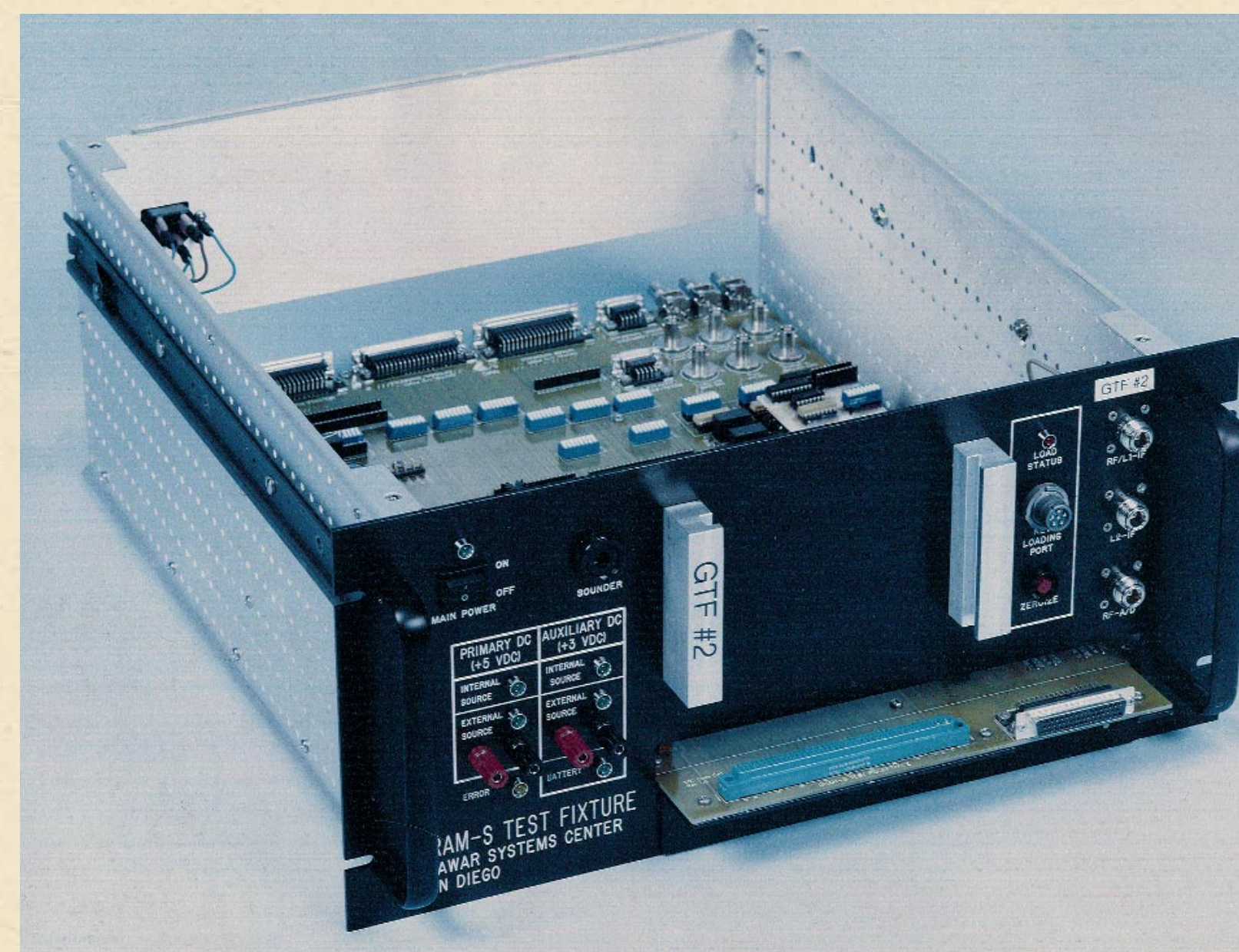
Within the GTF, test points exist for each signal on the GRAM-S I/O interface.

For operating voltage tests, front panel jacks permit an external power source for primary and auxiliary power. When the GTF is powered OFF, a battery is connected as the auxiliary power source.

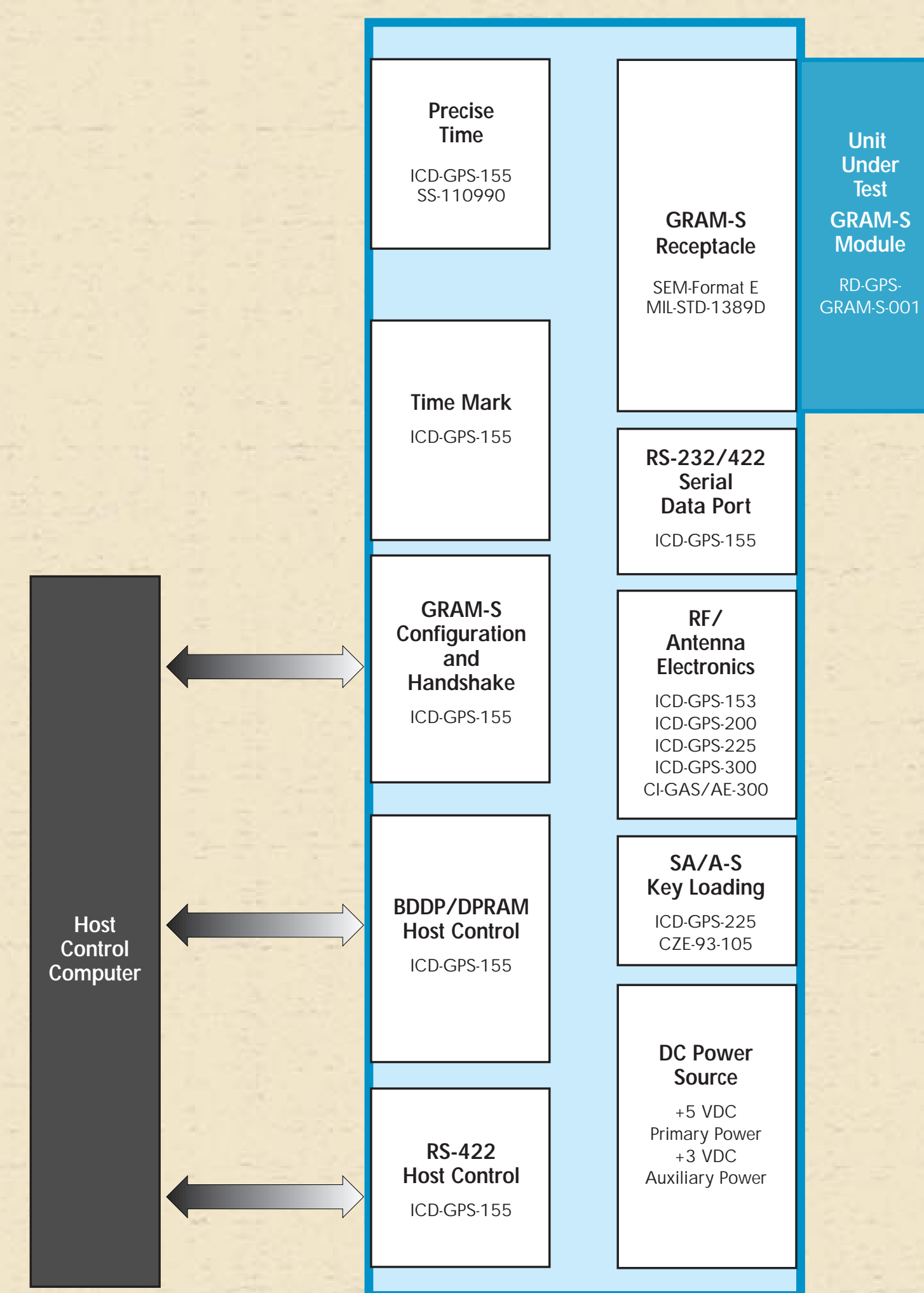
All signals within the GTF are routed on a five-layer (three signal layers, power, and ground) printed circuit board.

Future enhancements include:

- Remote trigger control via network interface card
- Data extraction/data logging using precise 1-PPS clock signal



**GRAM-S Test Fixture (GTF)**



**GRAM-S Test Fixture I/O Interfaces**

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